The Management University of Africa

MUA

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UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF COMMERCE

BCM 222 : BUSINESS STATISTICS

DATE: ***31ST JULY 2018***

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

QUESTION ONE

a) Explain four characteristics of a simple queue **(4 Marks)**

b) Solve the following pair of simultaneous equations using the matrix methods

$2x + 4y = 12$

$5x - y = 20$ **(6 Mark)**

c) An electric Firm manufactures two types of computers a standard model and a portable model. The production of a standard computer requires a capital of sh. 400 and 40 hours of labour. The production of a portable computer requires a capital expenditure of sh. 250 and 30 hours of labour. The firm has sh. 20,000 capital and 2160 hours available for production of standard and portable computers respectively. The firm makes profit of sh. 320 on each standard computer and sh 220 on each portable computer.

Required: formulate the mathematical model for this problem **(6marks)**

d) Find the optimum strategies and the value of the game from the following pay off matrix concerning two person game **(6 Marks)**

$$\begin{matrix} & \textit{Player } Y \\ \textit{Player } X & \end{matrix}\begin{bmatrix} 1 & 4 \\ 5 & 3 \end{bmatrix}$$

e) State any three assumptions of the linear programming **(3 Marks)**

QUESTION TWO

a) Differentiate between activity and events **(2 Marks)**

b) Given the following data:

Activity	Predecessors	Duration (weeks)
A	-	7
B	-	6
C	A,B	13
D	A,B	6
E	B	12
F	D,E	7
G	C,F	10
H	D,E	5
I	G,H	6

i. Draw the network for the project **(3 Marks)**

ii. Determine the critical activities and the project duration **(10 Marks)**

QUESTION THREE

a) Identify any four roles of statistics in business and industry **(4 Marks)**

b) A company is considering investing in one of three investment opportunities A, B and C under certain economic conditions. The payoff matrix for this situation is economic condition

Investment opportunities	State of Nature		
	1 £	2 £	3 £
A	5000	7000	3000
B	-2000	10000	6000
C	4000	4000	4000

Determine the best investment opportunity using the following criteria

i. Maximin **(2 Marks)**

ii. Maximax **(2 Marks)**

iii. Minimax **(4Marks)**

iv. Hurwicz (Alpha = 0.3) **(3 Marks)**

QUESTION FOUR

a) A fuel distributor has 4 trucks located in various locations in the city. They have received 4 orders whose distance from each track location is provided in the table below: Distance given in kilometers.

	Order location			
Track	**W**	**X**	**Y**	**Z**
A	15	22	17	13
B	9	12	10	16
C	7	10	15	8
D	11	13	14	10

Required: Assign the trucks to order location that minimize transportation cost. If it costs 100 sh. to transport fuel per KM, determine the total cost involved. **(12 Marks)**

b) Define the following terms as used in queuing theory **(3 Marks)**

i) Reneging

ii) Bulking

iii) Jockeying

QUESTION FIVE

a) Determine the total demand (x) for the industry 1, 2, 3 given the matrix of technical coefficients (A), and the final demand vector B. **(10 Marks)**

$$A = \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} \begin{pmatrix} 0.3 & 0.4 & 0.1 \\ 0.5 & 0.2 & 0.6 \\ 0.1 & 0.3 & 0.1 \end{pmatrix} \qquad B = \begin{pmatrix} 20 \\ 10 \\ 30 \end{pmatrix}$$

b) Define the following terms as used in network analysis: **(5 Marks)**

i) Parallel activities

ii) Dummy activities

iii) Critical path

iv) Critical activities

v) Project

QUESTION SIX

a) A team of 15 men is employed to unload lorries at a terminal. The team works a 6 hour day during which 36 lorries arrive (i.e. 6 per hour) and it takes 7 ½ minutes to unload one lorry with the team acting as a single unit. Lorries are served on a FIFO basis. It has been estimated that the cost of keeping lorries waiting is sh 6 per hour. Members of the team are each paid Sh 2.50 per hour. It is also estimated that if the size of the team increased to 20 men, the average service time would fall to 5 minutes.

Required;

Calculate the cost of the present system and the cost of the proposed system, and determine whether an increase in the size of the team would be justified on grounds of cost. **(12 Marks)**

b) State any three assumptions of a transportation model **(3 Marks)**

FORMULAS:

$Ns = \frac{\lambda}{\mu - \lambda}$ $Nq = \frac{\lambda^2}{(\mu(\mu - \lambda)}$

$Ts = \frac{1}{\mu - \lambda}$ $Tq = \frac{\lambda}{\mu\,(\mu - \lambda)}$ $P_{(queue)} = \frac{\lambda}{\mu}$

Expected Value, $Ev = \sum (X\ P(X))$ PERT formula $= \frac{O+4M+P}{6}$

Input Output Model, $X = (I - M)^{-1}\ d$